Petroleum Economics and Management
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Module - 12
Implications of Fiscal and Trade Policies
Lecture - 56
Oil Price Shock

Hello, I am Dr. Anwesha Aditya and welcome back to our NPTEL course Petroleum Economics and Management. We are in our last module that is Module 12 in the course where we are discussing the Implications of Fiscal and Trade Policies. This is the second lecture in module 12 and overall, this is the lecture number 56 in our course where we will be discussing about the impact of Oil Price Shock under different exchange rate regime.

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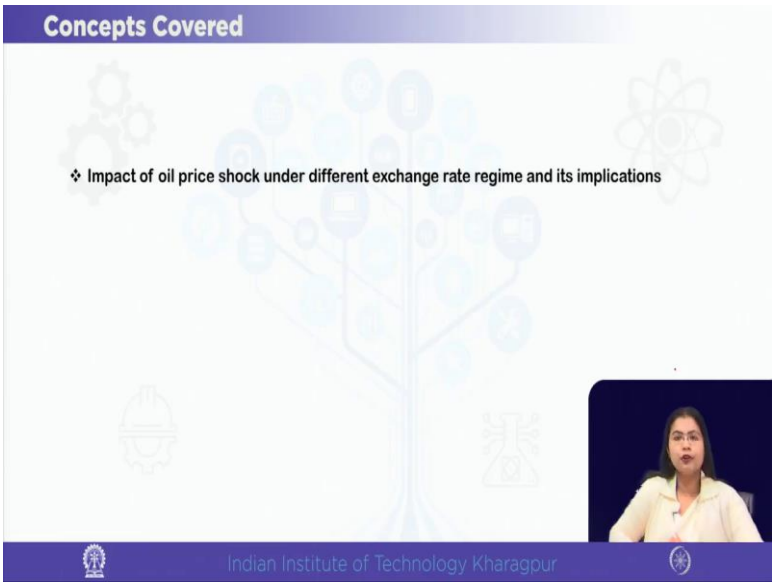

So, if you remember we have already discussed that since petroleum is a major traded good, we need to know how the price in the international market is determined because when we are engaging into transaction with the rest of the world our domestic currency will not do.

So, with this purpose we have devoted some time to discuss about what is exchange rate, how exchange rate is determined. But, for our purpose more important is how oil price

shock can affect the exchange rate of an importing country let say India because it is very relevant for Indian economy because we have to import lot of oil. And, oil being inelastic in nature what happens even if the price of oil increases, the quantity demanded falls by a lesser magnitude.

So, import bill increases and that puts huge burden on India's balance of payment. So, we are going to discuss the impact of oil price shock and that how that led to the balance of payment crisis that India suffered in 1991 because there are other reasons also, but some external events in the oil market, which were beyond the control of Indian economy, might have also triggered the crisis.

So, we will be discussing that and the subsequent reform policies especially the exchange rate reform policies to mitigate the oil price shock. But before that we need to know how oil price shock can affect the domestic economy under different exchange rate regime and what are the implications. So, with this idea we have developed today's lecture.

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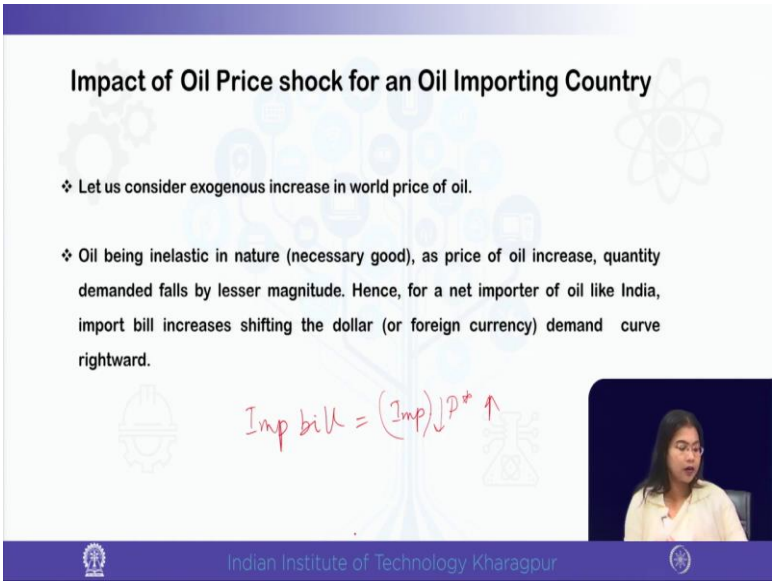

So, as I mentioned that oil being inelastic in nature, if suppose oil price increases due to some exogenous shock we have already in detail, we have analyzed, we have seen the movement of oil price over time since the development of the oil industry. And we have seen so many spikes in oil price and many of them are just uncertain or means not predicted, right.

So, if oil price shock occurs how the countries which are buying lot of oil how they are affected because you see we have devoted some modules like the module 10, 11 and even module 7 from the perspective of the natural resource endowed countries. So, what happens if natural resource is discovered suddenly and what is the adjustment in the domestic economy, how economic growth is affected, how uncertainty about oil price can affect this type of suppliers of natural resource?

But now we should also look to the other side because we know that natural resource like petroleum is distributed unevenly. So, what about the importing countries? Those who do not have sufficient domestic endowment they have to buy oil. So, what about these countries? So, with this idea in mind we have developed our last module.

So, now consider an exogenous increase in world price of oil. So, oil is inelastic in nature and it comes under the category of necessary good. If you remember we have used in our initial module on economics part basic of economics part, we use the elasticity values to categorize the goods. So, inelastic good means these are the examples of necessary good like food, medicine, goods of addiction and of course, petroleum products.

So, as price of oil increases you can think of quantity demanded should fall and import bill should fall. No, because that will not happen now suppose if you write the import bill what will be the import bill? Import bill is basically your amount of import into the price of import say the world price P star. So, if P star increases by law of demand so, law of demand holds amount of import should fall. So, that means, in import bill you see there are two terms which are moving in opposite direction.

Now, what will happen to import bill that will depend on what? We already know from our knowledge of economics that it depends on how change in price affects the quantity demanded. So, quantity demanded falls by less than proportionately in case of inelastic good. Therefore, import bill increases even if the oil price increases. So, quantity demanded falls lesser percentage. So, for a net importer of oil like India, the import bill increases.

If import bill increases see what will happen? The dollar demand curve will shift to the right or upward shift in the dollar demand curve will occur.

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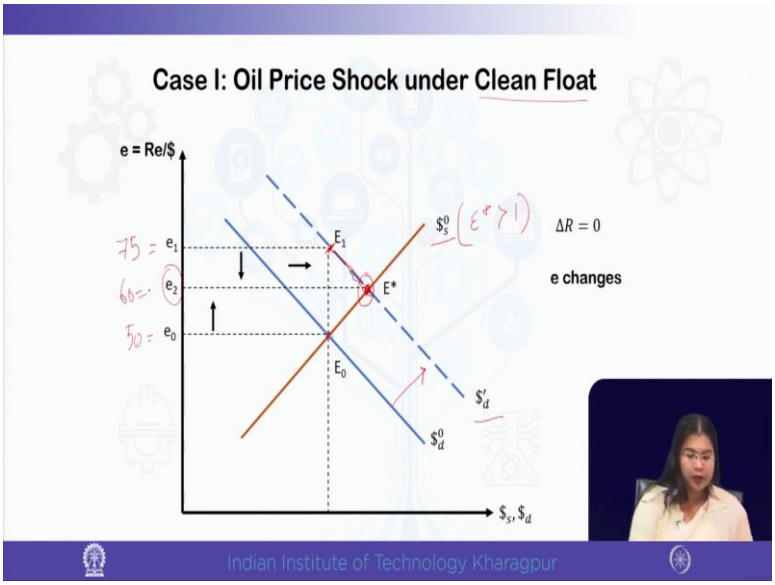

Because if you remember we have already plotted the dollar demand and dollar supply curve in our first lecture. So, here also we are plotting the Rupee – Dollar exchange rate on the vertical axis and the amount of supply and demand for dollar on the horizontal axis.

And, if you remember we are have already drawn the downward sloping dollar demand curve and upward rising dollar supply curve under the assumption that epsilon star that is home export supply elasticity is greater than 1. So, it is upward raising – the dollar supply curve.

So, suppose this is the initial exchange rate E0 which occurs at the intersection of the dollar demand curve initial dollar demand curve dollar d0. So, we know that under clean float exchange rate is market determined. So, initial exchange rate is at e0. Now, if you consider an oil price shock, we just now discussed that dollar demand increases, import demand, import bill increases which leads to an increase in dollar demand. So, therefore, the dollar demand curve shifts to the, right.

So, if dollar demand curve shifts to the right what will happen? The new equilibrium. So, initially the equilibrium shifts from you see from E0 to E1. So, your exchange rate initially shoots up from E0 to E1, right.

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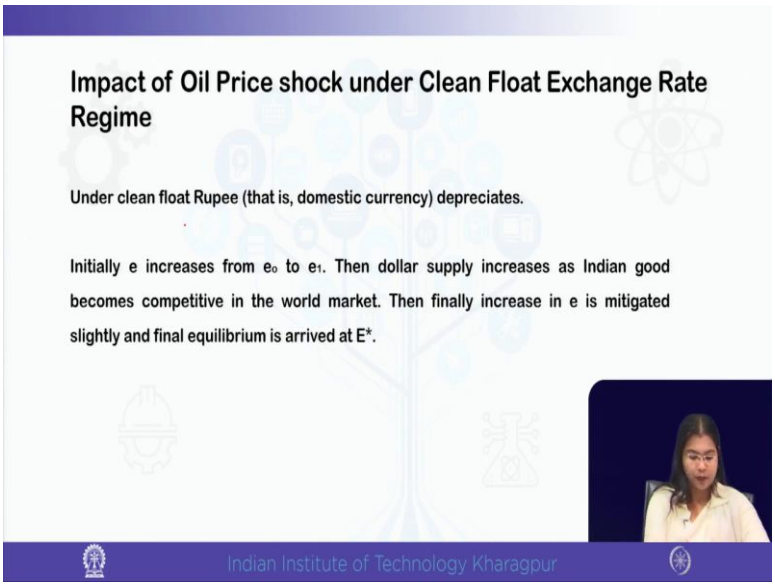

Because if dollar demand increases now, you see initially e increases from e0 to e1 but if e increases from e0 to e1 that means, rupee depreciates initially suppose e0 was say 50 rupee per dollar and at e1 it is suppose now rupee is 75 rupees per dollar. So, that means, rupee becomes cheaper or weaker. So, that means, what will happen in the export market, Indian products become more competitive. So, foreigners would like to buy Indian products.

So, then what will happen? We know that export is a major source of supply of dollar. So, dollar supply also increases. So, we can come down along this particular dollar supply. So, we come down along this particular new dollar demand curve and the equilibrium is again achieved at the intersection of the initial dollar supply curve, dollar supply S0 with the new dollar demand curve, dollar demand dash ok. So, is it clear?

So, initially with the oil price shock, dollar demand curve shifts from dollar demand d0 to dollar demand s dash. So, exchange rate increases from E0 to E1, but at E1 rupee depreciates. So, Indian products become cheaper. So, as if the dollar supply also increases.

So, we come down along this new dollar demand curve and again, the equilibrium is achieved and the intersection of the initial dollar supply curve dollar s0 with the new dollar demand curve dollar d dash. And finally, the exchange rate is determined at e2; e 2 is suppose it is 60 rupee per dollar.

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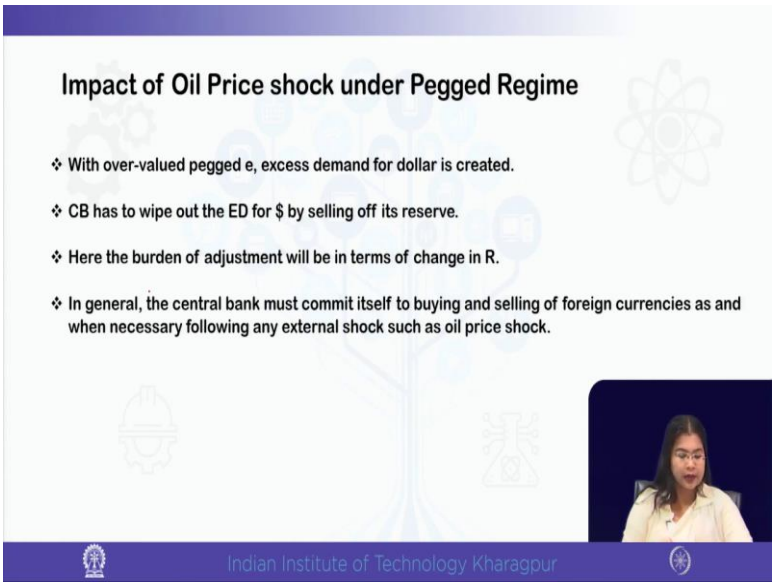

So, what we can conclude over here is that under the clean float, if there occurs an oil price shock so, e will adjust the exchange rate changes. So, exchange rate you can see now compared to e0 obviously, at e2 rupee gets depreciated. So, rupee depreciates under oil price shock; that means, increase in oil price.

So, by oil price shock, I essentially mean increase in sudden a sudden increase in oil price not a fall, ok. So, e changes, e depreciates. There is no change in the reserve held by the Central Bank or the monetary authority. So, del R is equal to 0. Under a clean float exchange rate is entirely market determined and there is no intervention by monetary authority. So, the oil price shock is entirely absorbed by the change in E. There is no change in R.

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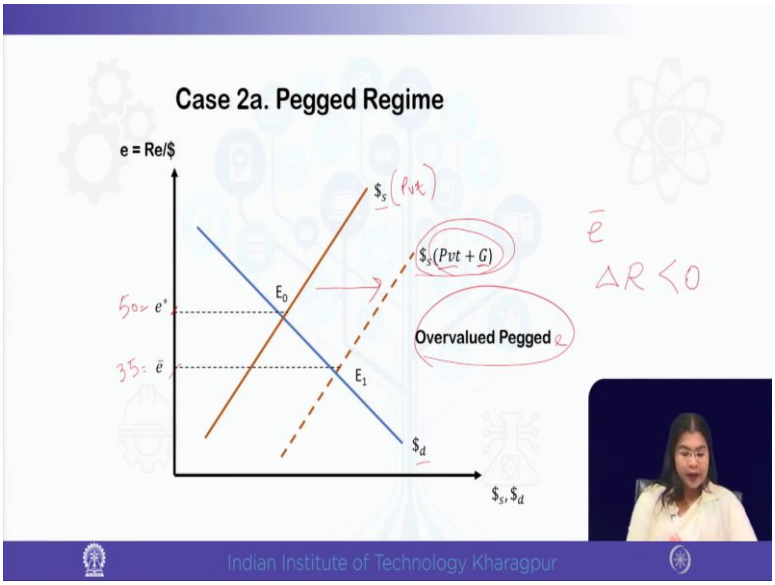

Now, what happens under the pegged regime? Because we know the other extreme case of pre clean float is the pegged regime or fixed exchange rate regime where the Central Bank pre-commits itself to maintain the exchange rate at a particular level. And, as we mentioned in the last class, generally the exchange rate is set at a level which is below the market clearing level.

So, suppose e star is the market determined exchange rate which occurs at the intersection of dollar demand curve and the dollar supply curve. So, at e star suppose it is E star is equal to 50 rupee per dollar. But, if the Central Bank thinks that the rupee is much weaker so, the Central Bank can set the rupee dollar exchange rate at say for example, say 35 rupee per dollar so, at e bar.

So, you are making rupee deliberately stronger. So, that is why if the exchange rate is set at a level below the market clearing level that is called overvalued pegged e. We have already discussed in the last class. So, what happens? See I have not yet introduced the oil price shock. So, before we are just considering the pegged regime before the oil price shock.

So, before the oil price shock you see if the Central Bank announces the exchange rate at e bar, can e bar be maintained without any intervention? No, because at e bar we can see already that if you are setting the price at a level below the market clearing level, we

know that by law of demand, demand increases; by law of supply, supply in falls. So, there will arise an excess demand.

So, how to then mitigate this excess demand because by excess demand price will push up. So, you cannot sustain the exchange rate because exchange rate will then adjust upward. So, you cannot do that you cannot allow that because under pegged regime, the monetary authority is committed to maintain the exchange rate at e bar.

So, what you will do? The monetary authority has to in wipe out the excess demand for dollar. So, how can it do? So, it has to increase the dollar supply. So, it can increase the dollar supply from its own reserve. So, you see the dollar supply curve now shifts to the right. So, this is the new dollar supply curve which is the sum of private supply of dollar plus the government supply of dollar.

You see this private supply of dollar is basically this one which we have already drawn in the previous class based on the sources of dollar supply like exporters, foreigners coming to India, Indians working abroad. But that is not enough, that dollar supply is not enough to maintain the exchange rate at e bar.

So, the Central Bank has to defend the exchange rate at e bar by selling or by supplying more dollar. So, the new dollar supply curve occurs here. So, here you see e is fixed at e bar, but R falls; the reserve with the Central Bank falls.

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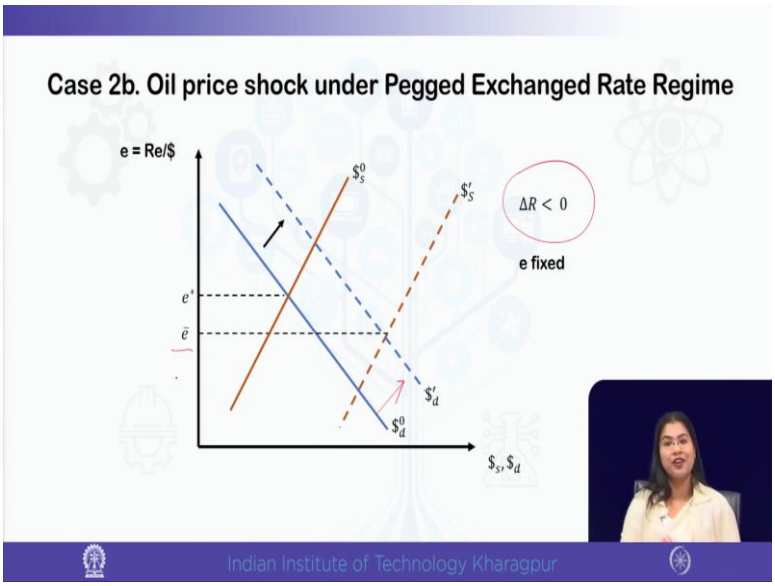

Now, you introduce the oil price shock. So, with the oil price shock what happens? So, before the oil price shock this was like your dollar supply has already increased. Now, with the oil price shock what will happen? With oil price shock as we already discussed under clean float for a country which is importing oil, the demand for dollar curve will shift to the right because with oil price shock import bill increases because oil is inelastic in nature.

So, with the new demand curve for dollar which shifts from dollar d 0 to dollar d dash you see the amount of excess demand increases at e bar, right. So, that means, now you can easily conclude that what the what should be the policy of the monetary authority? The monetary authority has to supply more dollar in order to maintain the exchange rate at e bar because before the oil price shock also we saw that at e bar the overvalued pegged e there was some excess demand for dollar being created.

Now, to maintain the exchange rate at E bar with the oil price shock in which dollar for the demand for dollar already increased the excess demand for dollar increases more. So, if excess demand for dollar increases more what will happen? The Central Bank has to run down its reserve faster, ok. So, that means, e is now fixed there is no change in e. e is fixed at e bar your economy is insulated, but the cost is huge. Reserve is running down very fast. We will discuss the implications ok.

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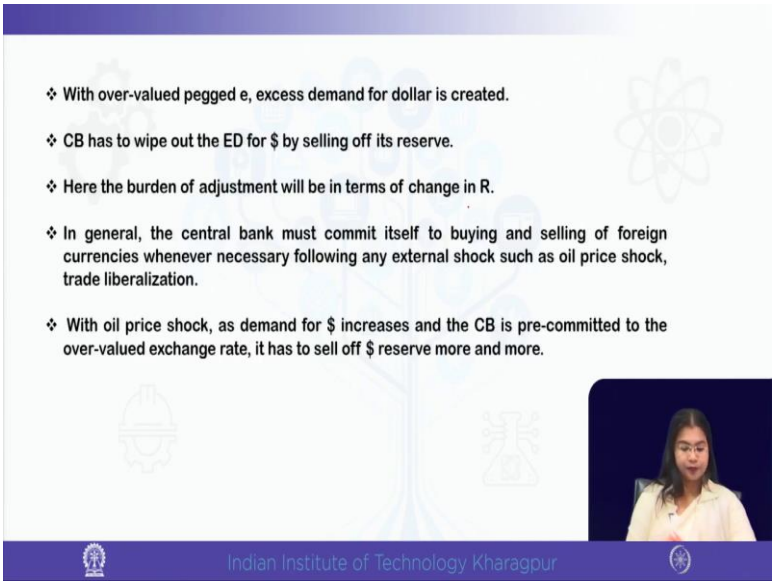

So, with oil price shock what will happen? The demand for dollar increases and is if the monetary authority is pre committed to maintain the exchange rate at the overvalued pegged e it has to sell off dollar reserve more and more. So, the system becomes more and more unsustainable because you see you are making rupee means the domestic currency deliberately stronger.

So, you are losing competitiveness in the world market. So, you are earning less dollar. You are earning less dollar, but you have to sell off your dollar you have to supply dollar from your dollar reserve to maintain the exchange rate and for maintaining the exchange rate at a overvalued rate you are earning less dollar. See, it is a two-way thing you can consider.

So, first of all for this overvalued pegged e you are earning less and to defend the overvalued pegged e you have to run down your reserve. So, at first place you are earning less and then you are running down your reserve faster. So, is it sustainable in the long run? So, you can easily guess that no, it is not sustainable in the long run.

So, we will be discussing in the next class that how the oil price shock during the 1990s as we know the Gulf War and the breaking down of USSR that actually triggered the balance of payment crisis that India suffered in 1991. So, we will be discussing the policy measures that were taken by the Indian government to maintain the exchange rate at the overvalued rate.

But finally, that did not work and we had to abandon we had to switch to a dirty float or managed float. So, we will discuss that in the next class. So, what here we can see that oil price shock under pegged e leads to a faster running down of the reserve with e unchanged.

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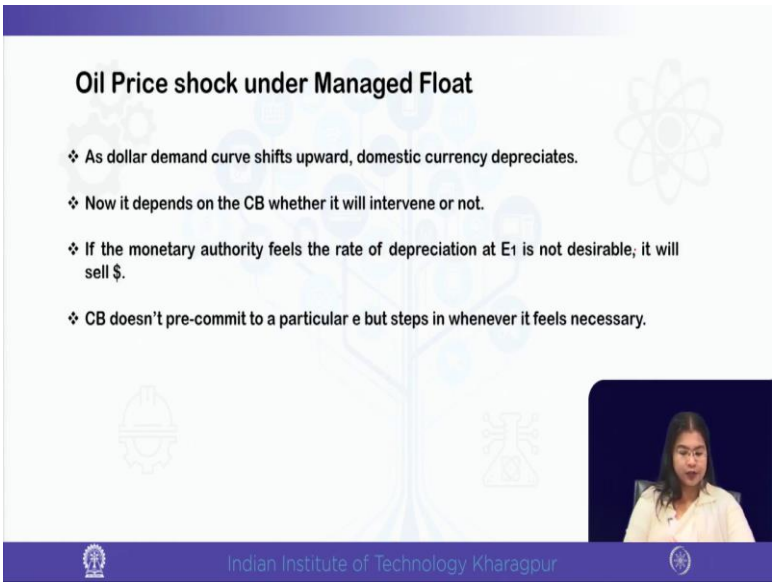

Now, what happens in the managed float?

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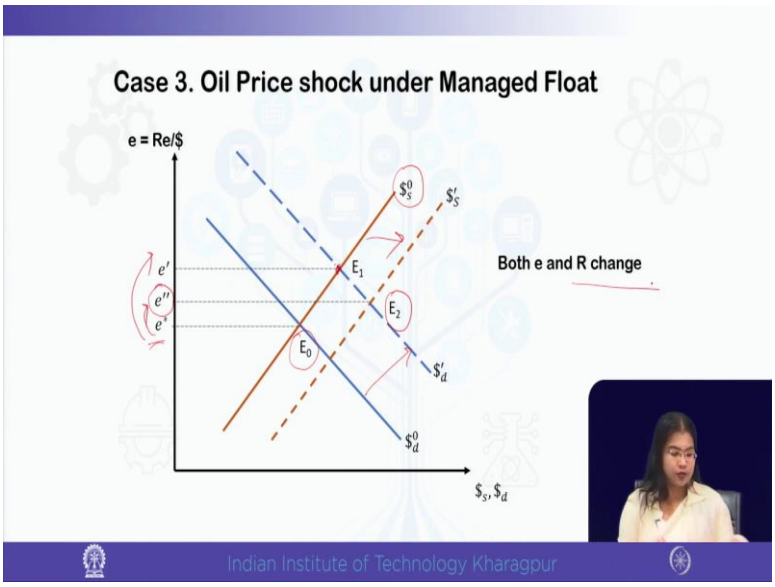

You see in the managed float as we discussed already exchange rate is market determined, but if it is too high or low then the Central Bank can interfere. So, you see we consider the same example of oil price shock for an importing country. So, for the oil importing country, oil price shock leads to increase in import bill and dollar demand curve shifts from dollar d0 to dollar d dash. So, initial exchange rate was at E0 ok, but now the domestic currency depreciates, right.

So, with the new dollar demand you see the initial dollar supply is dollar supply S0. So, initially the exchange rate what was at e star the equilibrium was at E0. So, now with the new dollar demand due to the oil price shock the exchange rate depreciates from e star to e dash. The equilibrium occurs at point E1. So, rupee becomes weaker and the foreign currency becomes stronger. So, rupee depreciates.

And, if the Central Bank thinks that the depreciation is too much because see there are both good and bad side, so, if your domestic currency becomes cheaper you gain competitiveness in the export market, but at the same time your imports become costlier. For one unit of dollar now you have to spend more rupee, right. So, your imports become costlier and if you are importing a lot of petroleum products so that puts more burden on your foreign exchange reserve.

So, if the Central Bank thinks that the depreciation is too much the Central Bank may try to interfere and may try to control the depreciation. So, it can do so by supplying some dollar. So, dollar supply can increase from dollar supply S0 to dollar supply S dash. So, if the dollar supply increases, we can see that the new equilibrium occurs at the intersection of new dollar demand and new dollar supply curve at point E2 and corresponding exchange rate is e double dash.

So, exchange rate depreciates as compared to e star, but to a lesser extent if Central Bank interferes. So, that means, here if the Central Bank does not interfere so, R will not change only e will change, but if Central Bank thinks that e has changed a lot then it will interfere in the market and R may change, ok.

So, if the monetary authority feels that the rate of depreciation is not desirable it will sell dollar, but the thing here is that it does not have any in-built balance of payment prices. We do not have that in managed float because the Central Bank is not pre committed to maintain the exchange rate. So, it is up to the objective of the Central Bank it can vary time to time. So, it can step in whenever it feels that it is necessary to interfere. So, it has not pre-committed itself to the exchange rate say E double dash.

If suppose the oil price shock is not that much it is only slightly. So, rupee does not depreciate much so, the Central Bank may not also interfere, it can allow the rupee to depreciate to a lower extent, but if the depreciation is too much it will interfere and in that case R will also change.

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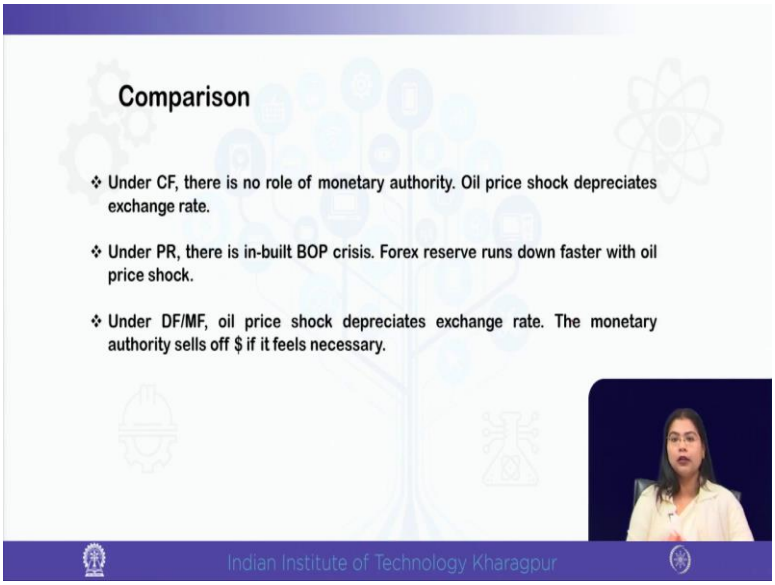

So, what we conclude from this discussion is that under clean float the monetary authority has no role to play. So, oil price shock is entirely absorbed by change in exchange rate. There is no change in reserve held with the monetary authority. Under pegged regime which is another extreme case as opposite to the clean float, there will be no change in exchange rate.

So, entire change in entire shock arising due to the oil price increase is absorbed by the change in the reserve. So, there is inbuilt balance of payment crisis because as we discussed that the policies undertaken to maintain the exchange rate at an overvalued rate is not sustainable. There are other arguments also which will be unfolding in the next lecture like this overvalued pegged e often can lead to black market if the Central Bank wants to impose some exchange control or quantitative restriction on rationing.

So, we also had this black market for foreign exchange which is more commonly known as Hawala market in India before 1991. So, we will be talking about all these the black-market part in the next lecture. So, under pegged regime with oil price shock e is not changing, R is running down faster and under dirty float or managed float oil price shock will depreciate exchange rate for an oil importing country.

Now, it depends on the objective or the intention of the monetary authority. So, it may interfere if it thinks that the depreciation is very much or if the depreciation is not too much it may not interfere also. If it does not interfere so, in the dirty float or managed

float e will only change. If the monetary authority interferes, then R will also change. So, it depends we cannot say a priori what will happen in dirty float. So, obviously, e will change whether R will change or not under a dirty float that depends on the monetary authority entirely.

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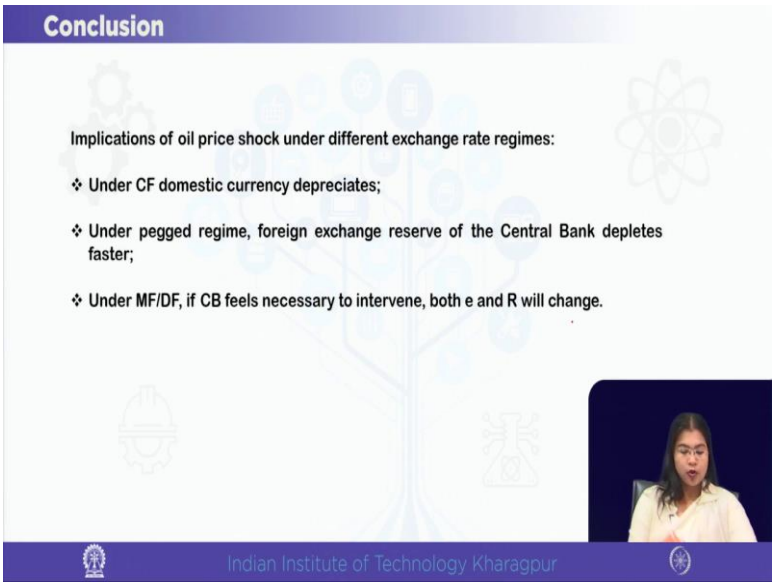

So, you see in today's lecture what we did we discussed the implication of oil price shock under different types of exchange rate regime. So, we mentioned that for an oil importing country under clean float, the domestic currency depreciates.

So, you see the economics with clean float will be subject to lot of volatility because the oil price shock is arising in the domestic market may be due to some war or political event, but that will have huge consequences for the domestic country because the clean in the currency depreciates a lot. So, economies no longer insulated from external shock. So, the economy will be subject to lot of fluctuations and volatility.

Under pegged regime on the other hand e is completely fixed, but we have already seen that it is not sustainable because the reserve with the Central Bank will run down at a faster rate and it may finally, lead to a balance of payment crisis. And, thirdly under the managed float or dirty float e obviously, exchange rate will depreciate with the oil price shock for an oil importing country, but whether R will change or not that depends on the monetary authority.

So, if the monetary authority interferes if it thinks that the rate of depreciation is too high then both R and e both will change, but if it does not interfere so, only e will change.

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So, as we already mentioned you can go through any standard International Economics book or any open Economy Macroeconomic related book. There are many books. So, like Krugman and Obstfeld or Caves Frankel Jones or Salvatore. And many there are many books.

So, you can follow any standard textbook. Another book we have followed is the book of International Economics by Acharya and another book on Indian Economy we have followed that is a book edited by Chetan Ghate in 2015. So, these are the main references.

So, in the next classes what we will be doing? We will be discussing with the specific example of the Indian economy, how the events in the global oil market might have triggered the balance of payment crisis of the Indian economy and whatever the policies undertaken mainly we will be focusing on the exchange rate policies that can mitigate the oil price shock.

So, thank you very much. See you in the last module.